

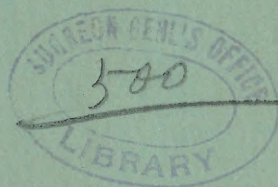
Welch (Wm H.)

With the Author's Compliments.

Box 1306

CIRRHOSIS HEPATIS ANTHRACOTICA.

By Professor WILLIAM H. WELCH, M. D.



[From *The Johns Hopkins Hospital Bulletin*, No. 11, February-March, 1891.]

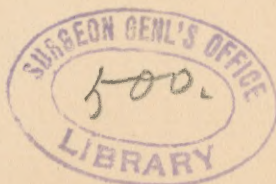
CIRRHOISIS HEPATIS ANTHRACOTICA.

By Professor WILLIAM H. WELCH, M. D.

(A PAPER READ BEFORE THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY, ON DECEMBER 15TH, 1890).

I have placed under the microscopes sections of a liver showing a peculiar form of cirrhosis associated with the deposition of coal pigment. The specimen of liver together with portions of other organs were sent to me recently by Dr. Unger, of Mercersburg, Pa., for microscopical diagnosis. All that I have been able to learn of the history of the man from whom the specimens were obtained is as follows. He was a German, about 70 years of age, who had lived for many years as a farmer in the neighborhood of Mercersburg, Pa. He is said to have worked as a weaver in Germany, but nothing more definite concerning his occupation or life in that country could be learned. The place where he lived in Pennsylvania is not particularly smoky. His health was good until about two years ago when he began to suffer from vomiting, loss of appetite and severe pain in the abdomen. Accumulation of fluid in the peritoneal cavity necessitated repeated tapplings by which serous fluid was withdrawn. The patient grew very weak and emaciated.

The autopsy was made by Dr. Unger, and on account of special external circumstances was necessarily hasty and incomplete. Only the abdominal organs were examined and Dr. Unger as regards these, was chiefly interested in the character of the new growth which was found. The peritoneum was found much thickened and presented many nodular masses, mostly of small size. The omentum was thickened and retracted into a hard, nodulated, cord-like mass. The mesentery was likewise thickened and retracted. A number of small, hard, whitish, circumscribed nodules were found in the superficial part of the liver. Pieces of the liver, omentum and peritoneum were sent to me for examination. Sections of the nodular tumors showed them to be carcinomata, presenting a fibrous stroma rich in cells and irregular



alveoli filled with polyhedral and cuboidal cells. The primary origin of the cancer was not determined, although doubtless a more complete autopsy would have revealed it.

The most interesting feature of the case, however, is the condition of the liver. Of this organ several pieces hardened in alcohol were sent. On the cut surface as well as through the capsule of the liver can be seen with the naked eye numerous small black specks and small streaks. These little black lines and dots are present everywhere throughout the liver scattered irregularly at intervals not more than 0.5 to 1 mm. apart. They are irregular in size and shape. They are not present in the cancerous nodules nor more abundant in their neighborhood than elsewhere. Some of the pieces of liver which were sent do not contain any cancerous nodules. Around many of the black specks the tissue has a grayish color. The prevailing color of the liver substance between the black deposit is yellowish brown.

On microscopical sections the little black spots and streaks, sometimes lying in a grayish tissue, sometimes in the yellowish brown liver substance, can be seen distinctly with the naked eye. By microscopical examination the black foci are seen to be due to the deposit of black granules in all respects identical with the coal pigment found in the lungs. The granules are of a pure black color, vary in size from granules about one quarter the diameter of a red blood corpuscle to very minute granules, occur sometimes in large conglomerate masses evidently composed of a close aggregation of granules, and are sometimes quite regularly round, but may be slightly irregular and angular in shape. They occur both free and enclosed in cells. They remain unchanged when the sections are treated with concentrated sulphuric acid as well as with boiling glacial acetic acid, hydrochloric acid, nitric acid, aqua ammoniae or concentrated liquor potassae. Compared with the coal pigment found so often in the lungs and bronchial glands absolutely no points of difference can be detected and I have therefore no hesitation in saying that they are coal particles.

The particles of coal pigment are not distributed uniformly throughout the liver as is the case with malarial pigment but occur in scattered areas. There are in some places small deposits of the pigment between unchanged liver cells. These deposits between liver cells are generally within round or irregular cells lying against the capillary walls and sometimes appear to be

contained in Kupfer's cells. The black pigment is never within the hepatic cells. As a rule the pigment lies within bands and nodules of dense fibrous tissue, and it is the character of these fibrous areas and the relation to them of the coal pigment that make the unusual feature of the case.

These fibrous areas differ in distribution and in appearance from the formation of fibrous tissue in ordinary hepatic cirrhosis. The fibrous areas are sharply circumscribed. They never completely surround a lobule. They occur most frequently in the interlobular tissue, but they are also often formed around the central veins as well as at any point in the interior of a lobule. They vary in size. Some are not larger than a group of five or six liver cells, others occupy nearly the entire field of the microscope with Zeiss objective A, ocular 3. The majority are much smaller than this latter dimension, averaging about one-sixth to one-eighth the diameter of a liver lobule. Five to eight such nodules can usually be seen in each field of the microscope with Zeiss A, ocular 3. The shape of the fibrous patches varies, but there is a general tendency to assume a round or oval shape. Many of the patches, however, are long and narrow following the course of the interlobular vessels or the rows of liver cells. The fibrous areas are in general composed of dense sclerotic fibrous tissue poor in cells, these cells being chiefly elongated connective tissue cells closely applied to the fibres and cells containing black pigment. Some of the areas, especially the smaller intra-lobular ones are composed of a hyaline indistinctly fibrillated material poor in cells. In the interlobular fibroid formations can be seen very much compressed interlobular veins, branches of the hepatic artery with thickened walls resulting from an obliterating endarteritis leading in some instances to complete obliteration of the vessel, and bile ducts. The bile ducts are few and there appear to be no so-called newly formed bile ducts so often observed in ordinary cirrhosis. All of the fibroid formations, whether intra-lobular or interlobular, contain in large amount black coal pigment, both free and in round, oval, and elongated, sometimes branching cells. With the exception of the comparatively few small deposits seen between normal liver cells, the coal deposits are found only in the fibroid masses and the growths of fibrous tissue do not occur except in association with the pigmentary deposits. There can be seen on careful examination unmistakable evidences that the new growth of fibrous tissue is referable directly to the deposition

of coal pigment. Where the pigment is surrounded by normal liver cells, it is present only in comparative small amount. There are places where a clump of the pigment is surrounded by two or three homogeneous liver cells devoid of nuclei or by a little hyaline or finely granular material replacing two or three immediately adjacent liver cells, and places where a small area of nearly homogeneous basement substance containing a mass of coal pigment has taken the place of not more than five or six liver cells in the interior of a lobule and all transitions exist between these small areas and the larger ones. The appearances indicate that small deposits of the coal pigment do not injure the surrounding liver cells, that larger deposits lead to a death of the immediately adjacent liver cells, and as a result of this loss of liver cells, a new growth of dense fibrous tissue is developed.

The histological picture is quite different from that of ordinary hepatic cirrhosis. Instead of interlacing bands of connective tissue more or less completely surrounding lobules or groups of lobules, we have in the present instance sharply circumscribed, round, oval and elongated discrete areas of sclerotic, at times nearly homogeneous, fibrous tissue, containing such masses of coal pigment as to appear in places almost uniformly black. Different as are the appearances from ordinary cirrhosis, there is manifestly a close analogy between the changes in this liver and those occurring in indurative anthracosis of the lungs. In both is found the same formation of circumscribed bands and nodules of dense fibrous tissue, colored black, with coal pigment.

This anthracosis of the liver has no relation to the presence of the secondary cancerous nodules in the liver which are entirely free from pigment.

Besides the changes mentioned there is no other lesion of the liver save a considerable bile pigmentation of the liver cells.

The presence of a small amount of coal pigment in the liver is not particularly uncommon. Instances have been reported by Arnold, Soyka, Weigert and others. We owe to Weigert and to Arnold especially the establishment of the especial conditions leading to this occurrence. Whereas under ordinary conditions the bronchial lymphatic glands form an effectual filter against the entrance into the blood of coal pigment inspired into the lung, Weigert has shown that adhesions and destructive inflammations may open the way for the passage of this pigment from the glands directly into adjacent blood vessels, and it is probable that similar

alterations in the lungs may lead to the same result. Arnold has pointed out the frequent association of emphysema of the lungs with the presence of coal pigment in the spleen, liver and elsewhere. It is unfortunate that in the present case we have no clue as to the condition of the lungs or of the bronchial glands, but we can hardly be mistaken in assuming that some abnormal condition existed which permitted an unusually free entrance into the circulating blood of coal pigment from these situations. I have repeatedly had the opportunity of confirming the observations both of Weigert and of Arnold, but I have never before seen a liver containing such a large amount of coal pigment as the present one, which is speckled everywhere with black dots and streaks. Ordinarily the presence of coal pigment in the liver is not associated with any important lesions referable to the deposition of the pigment. Careful examination, however, will often reveal atrophied liver cells and a small quantity of dense fibrous tissue poor in cells around coal deposits of considerable size, but so far as I can learn, this is the first instance recorded of a peculiar form of wide-spread cirrhosis of the liver dependent upon the presence of coal pigment, and I propose to designate the condition cirrhosis hepatitis anthracotica.

From the description already given, it is clear that the primary change leading to the cirrhosis is the atrophy and death of liver cells. Whether we are to attribute this cell death to a mechanical or to a chemical action of the pigment deposits can not be positively determined, but the former seems the more probable view. Still, as pointed out by Weigert, the coal particles inhaled may carry with them substances of an irritating nature, which may give to the particles an injurious action which the pure carbon granules themselves would not possess. Although occasionally the coal particles were present immediately around and in some places appeared to be within the capillary vessels, there was no such obstruction of the blood vessels by coal pigment as would explain the death of liver cells.

